The volume contains 279 problems in all: 9 in arithmetic, 51 in elementary algebra, 16 in plane geometry, 36 in plane trigonometry, 15 in analytical geometry, 9 in bookkeeping, 45 in advanced algebra, 20 in the theory of probabilities, 28 in calculus of finite differences, and 50 in calculus.

NOTES.

The concluding number of *Proceedings of the Royal Society*, London, series A, volume 98, published March 24, 1921, contains a fifty page notice of "John William Strutt, Baron Rayleigh, 1842–1919." There is also a fine frontispiece portrait.

The Mannheim & Polyphase Slide Rules. A Self Teaching Manual with tables of settings, equivalents and gauge points is the title of an 80-page pamphlet mainly by W. E. BRECKENRIDGE, associate in mathematics at Columbia University (New York, Keuffel & Esser, 1920). The supplement, "The slide rule in trigonometry" (pages 63–77), was written by Professor J. M. WILLARD, of the State College of Pennsylvania.

A. E. H. Love's *Theoretical Mechanics: an introductory treatise on the principles of dynamics, with applications and numerous examples* was first published by the Cambridge University Press in 1897. A second edition with few changes appeared ten years later. Of this, an authorized German translation by R. Polster was published in 1920 (Berlin, Springer, 14 + 424 pages. Price 48 marks). For English measures German have been substituted, and an alphabetic subject index has been added.

Various reviewers of Sir Thomas Heath's *Euclid in Greek, Book I, with Introduction and Notes* (Cambridge, 1920) [see, for example, *1920*, 263–266] seem to have overlooked the fact that only four years previously G. C. Sansoni of Florence published the very neat little volume edited by Giovanni Vacca with the following title: *Euclide. Il primo Libro degli Elementi, testo Greco, versione Italiana, Introduzione e note* (1916. 12mo. 20 + 122 pp.). On the last four pages there is a glossary of Greek words with the Italian equivalents.

The concluding number of the *Bulletin of the American Mathematical Society*, volume 27, was for June–July, 1921. It has been decided that in the future the volumes shall begin in January. Hence the first number of volume 28 is to be that for January, 1922.

Between 1913 and 1919 the following volumes of the *Opera Omnia* of Tycho Brahe have been published at Copenhagen (*1920*, 421): I, II, III, IV part 1, and VI. The first part of volume V (*Astronomiae Instauratae Mechanica*, 1598; 213 pages) has recently been published.

In *Il Bollettino di Matematica*, volume 17, 1920, pages 61–77, A. Natucci reviews for the tercentenary of the invention of analytic geometry (*1921*, 179) the edition of the works of Descartes edited by C. Adam and P. Tannery.

The second heft of *Jahrbuch über die Fortschritte der Mathematik*, volume 45, for 1914–1915, was published in July, 1921, nearly two years after the first part was issued (*1920*, 268). The concluding part is promised by November, 1921. The present heft (pages 369–944) contains, apart from the conclusion of combinatory analysis and calculus of probability, series, differential and integral calculus, theory of functions, pure elementary and synthetic geometry, analytic geometry, and three pages on mechanics. There are in the heft about 116 pages more than in the corresponding section of the *Jahrbuch* for the year 1912.

In *Revista Matemática Hispano-Americana*, January–April, 1921, there are a portrait, biographical sketch, and bibliography of the published papers of T. Levi-Civita (pages 1–10, 46–49). The list of published papers contains over one hundred titles. Supplementary to the first five numbers of the *Revista* for 1921 have been published 80 pages of a Spanish translation of *Questioni riguardanti le Matematiche elementari*, edited by Federigo Enriques, volume 1, which is possibly more familiar to American readers in the German translation. The above mentioned 80 pages cover about the same ground as the corresponding number of pages in the German translation.

We are indeed happy to learn that a considerable increase in the number of subscribers to *Journal de Mathématiques Pures et Appliquées* has made the period of suspension of publication a very brief one (compare *1921*, 134). Not only has volume 85, 1920, been published, but also (in May and August, 1921) the the first and second numbers of volume 86. The latter include an address, by Camille Jordan, pages 1–2, at the funeral of Georges Humbert (*1921*, 237), and a paper "Transformations of surfaces applicable to a quadric" by L. P. Eisenhart, 37–66.—The first four numbers of *Annales Scientifiques de l'Ecole Normale Supérieure*, volume 56, and fascicules I–II of *Bulletin de la Société Mathématique de France*, volume 49, have also appeared in 1921.

Two new Italian mathematical periodicals have been started this year by the Circolo Matematico di Catania (each 25 lire a year and printed by V. Giannotta, Catania). Of the one, *Esercitazioni Matematiche*, for the use of university students, Professor Michele Cipolla is the editor. The first number (52 pages) was for January–February. Professor Gaetano Scorza is the editor of the other, *Note e Memorie di Matematica*, fasc. 1 (64 pages).

Revista Matematică din Timişoara is the title of a periodical published by the Scoala Politecnică, for mechanics and mining, recently established (1920) in Timişoara, lately of Hungary but now of Roumania. The first number appeared in March, and the second in April, 1921. These issues contain brief articles, problems proposed and solved, notes and news, examination questions. The periodical is designed to assist those preparing to enter the Scoala.—*Gazeta Matematică*, the other Roumanian mathematical periodical, has been published

for twenty-six years and is the organ of the Society "Gazeta Matematică" with about fifty members desiring to promote the interests of mathematics in the secondary and higher schools of the country.

Sitzungsberichte der Preussischen Akademie der Wissenschaften, 1921, no. V, contains the Festvortrag, "Geometrie und Erfahrung" (pages 123–130), delivered by Einstein January 27, 1921, and an account (pages 116–123, 138–139) of the new edition of the complete works of Leibnitz. It was planned that this edition should occupy about 60 quarto volumes. By using smaller type and cutting down the editorial remarks, the commission of the Akademie now plans to reduce this estimate to 39 octavo volumes. The collected papers will be published in four series: philosophical (6 volumes), mathematical, in the field of natural science, and politico-historical; the correspondence in three series is to be classified: philosophical (6 volumes), in the fields of mathematics and natural science, and politico-historical and general (10 volumes). The 22 volumes of philosophical writings, and correspondence dealing with philosophy, politico-historical matters, and generalities are to be prepared first. One of these volumes is ready for publication.

The University of Illinois published, "November 22, 1920," an eight page illustrated pamphlet, whose contents are dated "January, 1921," entitled *Mathematical Models*. The author is Professor ARNOLD EMCH. He describes 18 models "designed and constructed in the mathematical department of the University of Illinois, . . . the first results of an effort to represent certain desirable features of mathematical instruction and research by adequate models, mechanisms, or graphs when they are not available otherwise. . . . For those interested . . . it will be possible to make arrangements with private firms for the reproduction and sale of the . . . models at prices which will be quoted upon application." The models include: (*a*) a variable string model of the hyperbolic paraboloid; (*b*) string models of certain cubic, quartic, quintic and sextic ruled surfaces; (*c*) tangent surfaces of a rectilinear (2, 2)-congruence; (*d*) models of projective generation of surfaces; (*e*) plane sections of a torus; (*f*) cellular division of space; and (*g*) three linkages—(α) Hebbert's cardioidograph, described in this MONTHLY, *1915*, 12–13; (β) a mechanism illustrating the description of certain ruled surfaces (Hebbert); and (γ) a cinematographic film of a Poncelet "polygon," *i.e.*, "a triangle remaining inscribed and circumscribed to two fixed circles respectively."

Since our last report (*1921*, 177), six more parts have been issued in *Publications of the Massachusetts Institute of Technology* "Contributions from the department of mathematics," series (since no. 7 changed from "serial") 2. These parts are number 17–22, February–July, 1921, and contain articles, by F. L. Hitchcock, Joseph Lipka, C. L. E. Moore, L. H. Rice, and Norbert Wiener (2), (see *1921*, 177, 178), reprinted from *American Journal of Mathematics, Bulletin of the American Mathematical Society, Comptes Rendus du Congrès International*

des Mathématiques, and *Proceedings of the American Academy of Arts and Sciences*. The first article in the *Proceedings*, volume 56, was "Motion on a surface for any positional field of force" by J. Lipka, in no. 4, March, 1921, pp. 157–182; the second article, "The axes of a quadratic vector" by F. L. Hitchcock, appeared in no. 9, June, 1921, pp. 331–351. The articles by N. Weiner were respectively three and four pages in length, being the papers he read at the so-called international congress of mathematicians (*1920*, 440).

Attention is directed to the interesting and admirably edited first three numbers (January–March, 1921, pp. 1–232) of *Periodico di Matematiche (Storia, Didattica, Filosofia)*, organ of the Società Italiana di Matematiche "Mathesis," edited by F. Enriques and G. Lazzeri. Although these numbers[1] are marked series IV, vol. 1, nos. 1–3, the periodical is really an entirely new one having very little in common with its immediate predecessors *Periodico di Matematiche* and *Bollettino della Società Italiana di Matematiche "Mathesis."* The second series of the *Periodico*[2], 1899–1903, edited by A. Lugli, was formerly the official organ[3] of the Society of "Mathesis" which was founded [4] in 1895 by a group of teachers, in secondary schools, interested in the discussion of didactic questions.

For several years prior to 1908 interest in this society was decidedly on the wane, but in that year it was reorganized, in collaboration with university professors, under the name Società Italiana di Matematiche "Mathesis."

We are indebted to Professor Enriques, of the University of Bologna, for many of the facts contained in this note.

Of the ten mathematical periodicals started since January, 1919, none are of such notable importance for mathematical research as *Fundamenta Mathematicae* of which two volumes have been published; the first (224 pages) in 1920, the second (287 pages) in 1921, before May 1. The periodical is confined to the publication of memoirs, notes, and problems dealing with the theory of aggregates and related questions (immediate applications of the theory of aggregates,

[1] Among the articles in them are: "The teaching of dynamics" by F. Enriques; "The theory of irrational numbers in antiquity" by T. Bonnesen; "Paradoxes of infinity" by G. Vivanti; "Reform in the teaching of mathematics in the United States of America" by D. E. Smith; and "On the construction of a triangle given the lengths of its angular bisectors" by O. Chisne—a problem discussed by R. P. Baker in his doctor's dissertation at the University of Chicago, published in 1911 (100 pages, 4to).

[2] *Periodico di Matematica per l'insegnament secondario* was founded by David Besso in 1886. The first series contained 13 volumes, published 1886–1898. The third series, edited by G. Lazzeri, was published at Leghorn (Livorno), 1904–1920. The first volume of the fourth series is being published by Zanichelli at Bologna (20 francs).

[3] The first official organ of the society was *Bollettino della Mathesis* of which three volumes were published at Rome and Turin, 1896–1898. Under the title *Bollettino della Società Italiana di Matematiche "Mathesis"* it was published with Severi as editor 1909–1910; with Castelnuovo as editor 1911–1914; with Berzolari as editor 1915–1918; with Enriques as editor 1919–1920. It was only since about 1910 that the *Bollettino* commenced to contain scientific articles apart from reports of transactions of various sections of the society.

[4] Under the society's auspices national conferences were held at Turin (1898), Leghorn (1901), Naples (1903), Florence (1908), Padua (1909), Genoa (1912), Trieste (1919) and Naples (1921).

analysis situs, mathematical logic, research regarding axioms). Most of the articles are in French, and the use of languages other than English, French, Italian and German is disallowed.

The first volume opens with a portrait frontispiece, and a brief sketch, of ZYGMUNT JANISZEWSKI, the founder of the journal, and a member of the editorial board. He was born at Warsaw July 12, 1888, became doctor de l'Université de Paris in 1911, maître de conférence in mathematics at the University of Leopold in 1913, and professor at the University of Warsaw in 1919. He died January 3, 1920. A list of his publications is given. The volume contains also 24 articles or notes by 8 authors, and 10 proposed problems.

In the second volume there are 30 articles or notes by 13 authors, and 6 more problems. The last article, 256–285, "Sur les correspondances entre les points de deux espaces," is by H. Lebesgue.

The chief editors of the volumes are STEFAN MAZURKIEWICZ and WACLAW SIERPINSKI, professors of mathematics at the University of Warsaw. The periodical is excellently printed on good paper, royal octavo size. Subscriptions to the volumes (15 French francs) may be sent to *Fundamenta Mathematicae*, Mathematical Seminary, University of Warsaw, Warsaw, Poland.

In 1912 it was arranged that the collected papers of Sophus Lie should be assembled under the general direction of Friedrich Engel, and published by Teubner in about seven large volumes. On account of the great increase in cost of publication, the undertaking would have fallen through had not the Norwegian mathematical union (Norsk Matematisk Forening) laid the matter before the committee on the research fund of three million crowns voted by the Norwegian Storting in 1919. As Engel writes, in the last number of the *Jahresbericht der deutschen Mathematiker Vereinigung*, Bäcklund of Lund, Bianchi of Pisa, Hjelmslev of Copenhagen, Klein of Göttingen, Study of Bonn, Veblen of Princeton, and Vessiot of Paris, united in stating that the publication of the collected papers of Sophus Lie was not only highly desirable but also necessary. As a result, the committee of the Storting fund voted 5000 crowns a year for four years, beginning with 1921, to assist in carrying the undertaking to a successful conclusion, which is now assured. Professor Poul Heegaard, of the University of Christiania, is to be one of the editors. It is expected that the first published volume, the third of the set, will be issued during 1921. The tentative title page of the edition is: SOPHUS LIE, *Gesammelte Abhandlungen, im Auftrage des Norwegischen Mathematischen Vereins und mit Unterstützung der Akademien zu Kristiania und Leipzig herausgegeben von Friedrich Engel und Poul Heegaard.*

ARTICLES IN CURRENT PERIODICALS.

BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY, volume 27, no. 5, February, 1921: "The thirteenth regular meeting of the southwestern section" by L. Ingold, 197–200; "A remark on skew parabolas" by G. Loria, 201; "The pseudo-derivative of a summable function" by W. L. Hart, 202–211; "Note on minimal varieties in hyperspace" by C. L. E. Moore, 211–216; "Notes on electrical theory" by H. Bateman, 217–225; Review by D. N. Lehmer of E.